

## ***Interactive comment on “High denitrification and anaerobic ammonium oxidation contributes to net nitrogen loss in a seagrass ecosystem in the central Red Sea” by Neus Garcias-Bonet et al.***

### **Anonymous Referee #3**

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General comments: This manuscript presents the results of a field study comparing nitrogen (N) removal (denitrification, anammox) and fixation rates in a seagrass meadow sediments and adjacent bare sediments. The authors found that N removal exceeded N<sub>2</sub> fixation in vegetated and bare sediments and that sediment OM and water temperature were important drivers of N processing rates. The manuscript is generally well written and provides valuable insight into N-cycling in seagrass beds. The inclusion of previously published N-cycling rates in the discussion provides useful context for the results. Specific comments: 1) As mentioned by the other referees, the discussion should mention the limitations of the acetylene reduction method for measuring N<sub>2</sub> fixation.

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2) One of the strong points of the study is the in-depth measurements of N-cycling rates. However, because there were so many comparisons, presenting these measurements can be difficult. Results section 3.2 (“Denitrification, anammox and N<sub>2</sub> fixation rates”) is dense and difficult to follow. I would suggest breaking this section into subsections, either by experimental variable (i.e. effect of a) vegetation, b) sediment depth, c) OM, d) temperature on denitrification/ anammox) or process rate (i.e. a) denitrification, b) anammox, c) fixation in vegetated vs. unvegetated sediments, at different depths, relationship with OM and temperature). It would be helpful to readers to do a separate results section for plant material N<sub>2</sub> fixation rates as well.

3) In some cases there are references to significant interactions with no description of what is occurring (e.g. L347-351) beyond references to the figures, which do not indicate statistical differences. Were these interactions ecologically meaningful? If not, it might be better to report these results in a supplemental table to keep the results streamlined.

4) Lines 450-450 of the discussion the authors argue that OM quality is an important driver of N<sub>2</sub> fixation but do not present it in the context of their system. Are you arguing that *E. acoroides* in vegetated sediments and algal biomass in unvegetated sediments are providing labile OM sources to N<sub>2</sub> fixers?

5) In the introduction (L99-107), consider stating objectives rather than what was measured to help readers better process the results.

6) L184: Include the equations in the text.

Technical corrections: L76: should be: Salt et al. (2017) L176: How much is a few? Do you have an actual detection limit? L210, 226: should be: “We ran” L322: “were large” –They really weren’t large compared to denitrification, and this qualitative description is not appropriate for a results section.